



Maharaja Agrasen Institute of Technology

(Approved by AICTE & Affiliated to GGSIP University, New Delhi)
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Department of Electrical & Electronics Engineering Renewable Energy Recourses Theory (ETEE 419)

ACADEMIC PLAN FOR SEMESTER-VII 2022

S.No.	TOPICS TO BE COVERED	Total No. of Lectures (42)	CO
UNIT-I (Solar Energy)			
1	Solar Energy: radiation - extra terrestrial, spectral distribution, solar constant, solar radiation on earth, measurements;	2	CO1
2	solar thermal system – solar thermal power and its conversion,	2	
3	solar collectors, flat plate, solar concentrating collectors, - types and applications;	2	
4	photovoltaic (PV) technology - photovoltaic effect, efficiency of solar cells, semi-conductor materials,	3	
5	solar PV system, standards and applications, tracking	2	
UNIT-II (Wind eENERGY)			
7	Wind and Small Hydropower Energy: wind data, properties, speed and power relation, power extracted,	2	CO2
8	wind distribution and speed prediction, wind map of India;	2	
9	wind turbines and electric generators. fundamentals – types of machines and their characteristics	2	
10	horizontal and vertical wind mills, elementary design principle, wind energy	2	

	farms,		
11	off-shore plants; small, mini and micro hydro power plants and their resource assessment, plant layout with major components shown.	3	
After Mid Term			
UNIT-III(Other NCES)			
13	Other Non-conventional Energy Sources: biomass – photosynthesis and origin of biomass energy, resources, cultivated resources, waste to biomass, terms and definitions – incineration, wood and wood waste, harvesting super tree, energy forest, phyrolysis, thermo-chemical biomass conversion to energy, gasification, anaerobic digester, fermentation, ;	3	CO3
14	gaseous fuel; geothermal – resources, hot spring, steam system, principle of working, site selection, associated problems in development	2	
15	ocean and tidal energy – principle of ocean thermal energy conversion, wave energy conversion machines, problems and limitations, fundamentals of tidal power, conversion systems and limitations		
16	; hydrogen energy – properties of hydrogen, sources, production and storage, transportation, problems for use as fuel	2	
17	; fuel cells – introduction with types, principle of operation and advantages	2	
UNIT-IV(Grid Connectivity)			
18	Grid Connectivity: wind power interconnection requirement - low-voltage ride through (LVRT), ramp-rate limitations, load following, reserve requirement,	2	CO4
19	, supply of ancillary services for frequency and voltage control	2	
20	impact of connection on stead-state and dynamic performance of power system; interfacing dispersed generation of solar energy with the grid,	2	
21	protective relaying, islanding, voltage flicker and other power quality	3	

	issues; role of non-conventional energy system in smart grid.		
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Course Objectives

ETEE 419.1	Understand the need for solar energy and its application.
ETEE 419.2	Analyze the technology for harnessing the wind power and small mini and micro hydro power plant.
ETEE 419.3	Understand biomass, geothermal, otec, tidal and wave energy, fuel cell and hydrogen energy as an emerging source.
ETEE 419.4	Analyze importance of grid connectivity and smart grid in providing continuous power.

